

AMENDMENTS TO THE CLAIMS

Kindly cancel claims 1, 20 and 22-24, amend claims 2, 5, 14, 15, 16, and 21 and add new claims 25-27 as shown in the listing of claims below. This listing of claims will replace all prior versions, and listings of claims in the application.

LISTING OF CLAIMS

- 1 Claim 1. (canceled)
- 1 Claim 2. (previously presented) A method for calibrating a frequency difference between two or
2 more lasers over an extended frequency range, comprising:
3 tuning the lasers in coordination with respect to one or more readily characterized narrow
4 frequency ranges to characterize one or more tuning parameters of each of the lasers over
5 the extended frequency range, wherein tuning the lasers in coordination includes:
6 calibrating the frequency difference with respect to the one or more tuning parameters
7 over a first narrow frequency range;
8 calibrating the frequency difference with respect to the one or more tuning parameters
9 over a second narrow frequency range; and
10 coordinating the resulting frequency difference calibrations for the first and second
11 narrow frequency ranges to calibrate the frequency difference with respect to the one or
12 more tuning parameters over the extended frequency range.
- 1 Claim 3. (currently amended) The method of claim 2, wherein the first and second narrow ranges
2 frequency have at least one common calibration point.
- 1 Claim 4. (previously presented) The method of claim 2, wherein the one or more tuning
2 parameters includes a temperature of at least one of the lasers.
- 1 Claim 5. (currently amended) A method for calibrating a frequency difference between two or
2 more lasers over an extended frequency range, comprising:[:]
3 measuring, with a frequency detector, a first value of a frequency difference between a
4 signal from a first laser and a signal from a second laser, wherein the first frequency
5 difference value lies within a finite range of the frequency detector;
6 fixing a parameter of the first laser to fix a frequency of the first laser;

7 varying a parameter of the second laser to vary a frequency of the second laser;
8 for one or more values of the second laser parameter, measuring, with the frequency
9 detector, a second value of the frequency difference between the signal from the first
10 laser and the signal from the second laser, wherein a frequency difference range between
11 the first and second frequency difference values lies within the finite range of the
12 frequency detector;
13 fixing the second laser parameter to fix the frequency of the second laser;
14 varying the first laser parameter to vary the frequency of the first laser; and
15 for one or more values of the first laser parameter, measuring, with the frequency
16 detector, a third value of the frequency difference between the signal from the first laser
17 and the signal from the second laser, wherein a frequency difference range between the
18 second and third frequency difference values lies within the finite range of the frequency
19 detector, and wherein a frequency difference range between the first and third frequency
20 difference values extends beyond the finite range of the frequency detector.

1 6. (original) The method of claim 5 wherein the frequency difference range between the first and
2 second frequency difference values is substantially the same as the finite range of the
3 frequency detector.

1 7. (original) The method of claim 5 wherein the frequency difference range between the second
2 and third frequency difference values is substantially the same as the finite range of the
3 frequency detector, whereby the frequency difference range between the first and third
4 frequency difference values is approximately twice the finite range of the frequency
5 detector.

1 8. (original) The method of claim 5, further comprising storing one or more pairs of values of the
2 first and second laser parameters and one or more corresponding frequency difference
3 values.

1 9. (original) The method of claim 5 further comprising determining from the first, second and
2 third values of the frequency difference one or more calibrated frequency difference
3 values, wherein each of the one or more frequency difference values corresponds to
4 particular pair of values for the parameters of the first and second lasers.

1 10. (original) The method of claim 9 wherein one or more of the first and second laser
2 parameters is a laser temperature.

1 11. (original) The method of claim 10 wherein the calibrated frequency difference values cover a
2 frequency difference range that is greater than the finite range of the frequency detector.

1 12. (previously presented) The method of claim 2, wherein tuning the lasers in coordination with
2 respect to one or more readily characterized narrow frequency ranges to characterize one
3 or more tuning parameters of each of the lasers over the extended frequency range
4 includes:
5 fixing a tuning parameter of a first laser;
6 varying a tuning parameter of a second laser,
7 measuring a frequency difference value between the first and second lasers that lies
8 within a finite range ; and
9 associating a calibrated frequency difference value with a pair of values of the tuning
10 parameters of the lasers.

1 13. (previously presented) The method of claim 2, wherein the frequency of at least one of the
2 lasers is tuned by changing a temperature of the laser.

1 14. (currently amended) A computer readable medium having embodied therein a set of
2 computer readable instructions for implementing a method for calibrating two or more
3 lasers over an extended frequency range, the ~~method~~ computer readable instructions
4 comprising:
5 a set of instructions for tuning the lasers in coordination with respect to one or more
6 readily characterized narrow frequency ranges to characterize one or more tuning
7 parameters of each of the lasers over the extended frequency range, wherein execution of
8 the instructions on a computer generates signals that cause a detector to measure a
9 frequency difference between the lasers and one or more tuning controllers to adjust one
10 or more tuning parameters of the lasers in response to the signals,
11 wherein the set of computer readable instructions for tuning the lasers in coordination
12 includes:

13 a set of instructions for calibrating the frequency difference with respect to the one or
14 more tuning parameters over a first narrow frequency range;
15 a set of instructions for calibrating the frequency difference with respect to the one or
16 more tuning parameters over a second narrow frequency range; and
17 a set of instructions for coordinating the resulting frequency difference calibrations for
18 the first and second narrow frequency ranges to calibrate the frequency difference with
19 respect to the one or more tuning parameters over the extended frequency range.

1 15. (previously presented) An apparatus for calibrating a frequency difference between a first
2 laser and a second laser, the apparatus comprising:
3 means for calibrating the frequency difference with respect to the one or more tuning
4 parameters over a first narrow frequency range;
5 means for calibrating the frequency difference with respect to the one or more tuning
6 parameters over a second narrow frequency range; and
7 means for coordinating the resulting frequency difference calibrations for the first and
8 second narrow frequency ranges to calibrate the frequency difference with respect to the
9 one or more tuning parameters over the extended frequency range.

1 16. (currently amended) An apparatus for calibrating a frequency difference between a first laser
2 and a second laser, the apparatus comprising, comprising:
3 a first tuning controller coupled to the first laser;
4 a second tuning controller coupled to the second laser;
5 an optical coupler optically coupled to the first laser and the second laser;
6 a frequency detector coupled to the optical coupler; and
7 a controller coupled to the frequency detector and the first and second tuning controllers,
8 wherein the controller includes a processor and a memory, the memory containing a set
9 of instructions that are executable by the processor, the set of instructions implementing a
10 method for calibrating a frequency difference between the first and second lasers over an
11 extended frequency range, wherein the tuning controllers and frequency detector are
12 operable in response to signals from the controller, the method instructions including
13 a set of instructions directing the tuning controllers and frequency detector to calibrating
14 calibrate a frequency difference between the first and second lasers with respect to the

one or more tuning parameters of the first and/or second laser over a first narrow frequency range that is within a frequency range of the detector;
a set of instructions directing the tuning controllers and frequency detector to calibrating
calibrate a frequency difference between the first and second lasers with respect to the one or more tuning parameters over a second narrow frequency range that is within the frequency range of the detector and that is different from the first narrow frequency range; and
a set of instructions for coordinating the resulting frequency difference calibrations for
the first and second narrow frequency ranges to calibrate the frequency difference between the first and second lasers with respect to the one or more tuning parameters over an extended frequency range that is greater than the frequency range of the detector.

17. (original) The apparatus of claim 16 wherein the frequency detector includes a local detector optically coupled to the optical coupler, a phase locked loop coupled to the local detector and the controller, an integrator coupled to the phase locked loop and the controller, a direct digital synthesizer coupled to the phase locked loop and the controller, and a crystal oscillator coupled to the direct digital synthesizer.

18. (currently amended) The apparatus of claim 17 wherein the crystal oscillator is ~~NIST~~
traceable calibrated in a manner traceable to a National Institute of Standards and
Technology reference source.

19. (original) The apparatus of claim 17 wherein the frequency detector further includes a pre-scaler coupled between the local detector and the phase locked loop.

20. (canceled)

21. (currently amended) An optical signal generator apparatus, comprising:
a first laser;
a second laser;
a first tuning controller coupled to the first laser;
a second tuning controller coupled to the second laser;
an optical coupler optically coupled to the first laser and the second laser;
a frequency detector coupled to the optical coupler; and

8 a controller coupled to the frequency detector and the first and second tuning controllers,
9 wherein the controller includes a processor and a memory, the memory containing a set
10 of instructions that are executable by the processor, the set of instructions implementing a
11 method for calibrating a frequency difference between the first and second lasers over an
12 extended frequency range, wherein the tuning controllers and frequency detector are
13 operable in response to signals from the controller, the method instructions including
14 a set of instructions directing the tuning controllers and frequency detector to calibrating
15 calibrate a frequency difference between the first and second lasers with respect to the
16 one or more tuning parameters of the first and/or second laser over a first narrow
17 frequency range that is within a frequency range of the detector;
18 a set of instructions directing the tuning controllers and frequency detector to calibrating
19 calibrate a frequency difference between the first and second lasers with respect to the
20 one or more tuning parameters over a second narrow frequency range that is within the
21 frequency range of the detector and that is different from the first narrow frequency
22 range; and
23 a set of instructions for coordinating the resulting frequency difference calibrations for
24 the first and second narrow frequency ranges to calibrate the frequency difference
25 between the first and second lasers with respect to the one or more tuning parameters
26 over an extended frequency range that is greater than the frequency range of the detector.

1 22-24. (canceled)

1 25. (previously presented) The apparatus of claim 21 wherein the frequency detector includes a
2 local detector optically coupled to the optical coupler, a phase locked loop coupled to the
3 local detector and the controller, an integrator coupled to the phase locked loop and the
4 controller, a direct digital synthesizer coupled to the phase locked loop and the controller,
5 and a crystal oscillator coupled to the direct digital synthesizer.

1 26. (previously presented) The apparatus of claim 25 wherein the frequency detector further
2 includes a pre-scaler coupled between the local detector and the phase locked loop.

1 27. (currently amended) The apparatus of claim 25 wherein the crystal oscillator is ~~NIST~~
2 traceable calibrated in a manner traceable to a National Institute of Standards and
3 Technology reference source.